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10/527,020	03/08/2005	Nobuaki Kawahara	2005_0207A	9416

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EXAMINER	
WILLIAMS, LAWRENCE B	

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/527,020	KAWAHARA, NOBUAKI	
	Examiner	Art Unit	
	LAWRENCE B. WILLIAMS	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☒ Claim(s) *1,3,5* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: Claim 1 recites the limitation "the circle covering" in lines 6-7. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests, "a circle covering".

Appropriate correction is required.

2. Claim 3 is objected to because of the following informalities: Claim 3 recites the limitation "the signal points of the integral multiple of 4" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests, "signal points of an integral multiple of 4".

Appropriate correction is required.

3. Claim 5 is objected to because of the following informalities: Claim 5 recites the limitation "the circle covering" in line 12. There is insufficient antecedent basis for this limitation in the claim. The examiner suggests, "a circle covering".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites, "when the M signal points are spaced on the I-Q plane around a point of origin to have a uniform space *a* in directions of the an I-axis and a Q-axis". According to applicant's disclosure, the M signal points are not spaced to have a uniform space "*a*". The uniform space "*a*" refers to conventional technology (Fig. 3a). From applicant's disclosure, the M signal points are spaced such that a space between any two arbitrary signal points is larger than the minimum space "*a*" between signal points in the *conventional technology* (pg. 25, lines 4-9). Thus applicant's signal points are never "spaced on the I-Q plane around a point of origin to have a uniform space *a,* but spaced according to pg. 25, lines 4-9, and Fig. 3b of applicant's disclosure. The examiner suggests applicant rewrite the claim to particularly and distinctly claim the subject matter regarded as the invention.

6. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 5 recites, "when the M signal points are spaced on the I-Q plane around a point of origin to have a uniform space *a* in directions of the an I-axis and a Q-axis". According to applicant's disclosure, the M signal points are not spaced to have a uniform space "*a*". The uniform space "*a*" refers to conventional technology (Fig. 3a). From applicant's disclosure, the M signal points are spaced such that a space between any two arbitrary signal points is larger than the minimum space "*a*" between signal points in the *conventional technology* (pg. 25, lines 4-9). Thus applicant's signal points are never "spaced on the I-Q plane around a point of origin

to have a uniform space *a*, but spaced according to pg. 25, lines 4-9 and Fig. 3b of applicant's disclosure. The examiner suggests applicant rewrite the claim to particularly and distinctly claim the subject matter regarded as the invention.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Galins (US Patent 7,039,126 B1).

(1) Regarding claim 1, in light of the 112 rejection of claim 1 cited above, the examiner has interpreted claim 1 in the broadest sense possible. Galins discloses in Fig. 3 (32-ary constellation), a communications method for carrying out communications using a plurality of M (32) signal points to be placed on an I-Q plane (col. 1, lines 42-46; Galins discloses an imaginary axis (I) and real axis (Q)), characterized in that when the M signal points are spaced on the I-Q plane around a point of origin to have a uniform space a uniform space between them in directions of an I-axis and a Q-axis, inside of a circle or inside of the circle covering over the circle (Fig. 3 discloses three amplitudes (circles, col. 4, lines 65-66) having a radius of a space b (space b would be the radius of the largest circle) between the point of origin and a point of the

largest value in both directions of the I-axis and the Q-axis, the M (32) signal points are placed in such a manner that a space between any two arbitrary signal points is equal to or larger than the uniform space a, and a space between at least a pair of signal points is larger than the uniform space a. (Galins discloses the signal points of Fig. 3 placed as applicant. The examiner points to pg. 25, lines 10-19 of applicant's disclosure). Applicant discloses the first quadrant, in the most internal circle, the signal points are each placed in the direction of the angle (phase) of 45 degrees. Galins discloses the third amplitude level (64) corresponding the applicant's most internal circle including four symbols in the direction of 45 degrees (chart in col. 5 discloses points 29, 30, 31, 32 at 45, 135, 225, 315 degrees). Applicant discloses in the middle circle, the signal points are each placed at in the angle direction of 15, 45, and 75 degrees (separated by 30 degrees). Galins also discloses the 2nd amplitude level (62), which corresponds to applicant's middle circle, signal points separated by 30 degrees (symbol 17, 18, 19 placed at 22.5, 52.5, and 82.5). Applicant discloses the most external circle signal points are each placed at 11.25, 33.75, 56.25 and 78.75 degrees. Galins also discloses signal points 1-4 of the 1st amplitude level (60) which corresponds to applicant's most external circle) at 11.25, 33.75, 56.25 and 78.75). Galins follows the same placement pattern of the signal points as applicant, and shows the coordinates, both in polar coordinates and cartesian coordinates which show that when the M signal points are spaced on the I-Q plane around a point of origin to have a uniform space a in directions of an I-axis and a Q-axis, inside of a circle or inside of the circle covering over the circle having a radius of a space b between the point of origin and a point of the largest value in both directions of the I-axis and the Q-axis, the M signal points are placed in such a manner that a space between any two arbitrary signal points is equal to or larger than the uniform space a ($2^{1/2}$ z/2 p-1; where z

corresponds to the radius (1) of the first amplitude level, 60 and p=3 for a 32-QAM constellation), and a space between at least a pair of signal points is larger than the uniform space a ($2^{1/2}$ z/2 p-1; where z corresponds to the radius (1) of the first amplitude level, 60 and p=3 for a 32-QAM constellation).

(2) Regarding claim 5, Galins discloses in Fig. 1, a communications system for carrying out signal communications from a communications device at a transmission end (12, transmitter) to a communications device at a reception end (receiver, 14) using a plurality of M signal points (col. 3, lines 10-14; Galins discloses the modulator utilizing a M-ary QAM modulation format) to be placed on an I-Q plane (col. 1, lines 42-46; Galins discloses an imaginary axis (I) and real axis (Q), characterized in that the communications device at the transmission end comprises: signal point conversion means (modulator, col. 3, lines 20-23, Fig, 3 discloses the 32-ary constellation) for converting transmitting data into a signal point using a placement of signal points in which, when the M signal points are spaced on the I-Q plane around a point of origin to have a uniform space a in directions of an I-axis and a Q-axis, inside of a circle or inside of the circle covering over the circle (Fig. 3 discloses three amplitudes (circles, col. 4, lines 65-66) having a radius of a space b (space b would be the radius of the largest circle) between the point of origin and a point of the largest value in both directions of the I-axis and the Q-axis, the M signal points are placed in such a manner that a space between any two arbitrary signal points is equal to or larger than the uniform space a, and a space between at least a pair of signal points is larger than the uniform space a; (Galins discloses the signal points of Fig. 3 placed as applicant. The examiner points to pg. 25, lines 10-19 of applicant's disclosure). Applicant discloses the first

quadrant, in the most internal circle, the signal points are each placed in the direction of the angle (phase) of 45 degrees. Galins discloses the third amplitude level (64) corresponding the applicant's most internal circle including four symbols in the direction of 45 degrees (chart in col. 5 discloses points 29, 30, 31, 32 at 45, 135, 225, 315 degrees). Applicant discloses in the middle circle, the signal points are each placed at in the angle direction of 15, 45, and 75 degrees (separated by 30 degrees). Galins also discloses the 2nd amplitude level (62), which corresponds to applicant's middle circle, signal points separated by 30 degrees (symbol 17, 18, 19 placed at 22.5, 52.5, and 82.5). Applicant discloses the most external circle signal points are each placed at 11.25, 33.75, 56.25 and 78.75 degrees. Galins also discloses signal points 1-4 of the 1st amplitude level (60) which corresponds to applicant's most external circle) at 11.25, 33.75, 56.25 and 78.75). Galins follows the same placement pattern of the signal points as applicant, and shows the coordinates, both in polar coordinates and cartesian coordinates which show that when the M signal points are spaced on the I-Q plane around a point of origin to have a uniform space a in directions of an I-axis and a Q-axis, inside of a circle or inside of the circle covering over the circle having a radius of a space b between the point of origin and a point of the largest value in both directions of the I-axis and the Q-axis, the M signal points are placed in such a manner that a space between any two arbitrary signal points is equal to or larger than the uniform space a ($2^{1/2}$ z/2 p-1; where z corresponds to the radius (1) of the first amplitude level, 60 and p=3 for a 32-QAM constellation), and a space between at least a pair of signal points is larger than the uniform space a ($2^{1/2}$ z/2 p-1; where z corresponds to the radius (1) of the first amplitude level, 60 and p=3 for a 32-QAM constellation), and signal transmission means (transmitter 12) for transmitting a signal structured by the signal point as a result of conversion by the signal point

conversion means, and the communications device at the reception end comprises: signal reception means (receiver, 14) for signal reception; signal point position determination means (demodulator, 42) for making a determination for a position of the signal point of the received signal on the I-Q plane; and data conversion means (demodulator, 42) for converting the signal point of the received signal into data corresponding to a signal point to be identified based on a determination result by the signal point determination means. Though Galins does not use the terms, a signal position determination means and data conversion means, such means would be inherent in the demodulator of Galins receiver. Galins discloses in col. 4, lines 4-9, "Demodulator 42 demodulates the received signal in accordance with the M-ary QAM format implemented in modulator, 18. Demodulator 42 thus outputs the data initially modulated by modulator, 18"). The examiner makes reference to Fig. 3 of the 32-QAM signal points transmitted by modulator, 18. Each signal point is represented by a position on the I-Q plane as noted by the chart in col. 5. Thus in order for the demodulator to "output the data (Galin discloses the constellation of Fig. 3, enabling modulation of up to a 5 bit word or symbol; col. 4, lines 58-60) initially modulated by modulator, 18", a position of the signal would have to be determined. Thus the signal position determination means and data conversion means are inherent in Galins's demodulator.

9. Claim 4 is rejected under 35 U.S.C. 102(b) as being anticipated by Hoffman (US Patent 4,811,363).

Hoffmann discloses a method for recovering a phase difference signal wherein he discloses a communications method for converting a signal point of a received signal into data

corresponding to any of a plurality of M (Fig. 5 discloses a decision diagram for a 64 QAM system), signal points to be placed on an I-Q plane (in QAM, I and Q plane refers to standard x and y axes, respectively), characterized in that a determination is made for a level of the signal point of the received signal (col. 5, lines 12-44; Hoffman discloses determining the amplitude level of the signal point), and another determination is made for a phase of the signal point of the received signal on the I-Q plane (col. 7, line 15-col. 8, line 10), and the signal point of the received signal is converted into data equivalent to a value based on determination results (col. 8, lines 11-15).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Galins (US Patent 7,039,126 B2) as applied to claim 1 above, and further in view of Webb (US Patent 5,828,695).

Claim 2 inherits all limitations of claim 1 above. As noted above, Galins discloses all limitations of claim 1. Furthermore, Galins also discloses in Fig. 3, wherein the M (32) signal points are placed over a plurality of circles (3; col. 4, lines 65-66) on the I-Q plane (col. 1, lines 42-46; Galins discloses an imaginary axis (I) and real axis (Q)) around the point of origin, and radius of the largest circle is the space b (space b would be the radius of the largest circle).

Galins does not disclose a radius of the respective circles is an integral multiple of a radius of the smallest circle.

However, Webb discloses a QAM system in which the constellation is modified in accordance with channel quality wherein he teaches signal points placed over a plurality of circles and a radius of the respective circles is an integral multiple of the smallest circle (col. 4, lines 16-19; Webb discloses the radii of the rings at a ratio of 3 to 1 (integral multiple)).

One of ordinary skill in the art at the time of invention would have been motivated to incorporate the teachings of Webb to enhance BER performance.

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Galins (US Patent 7,039,126 B2) and Webb (US Patent 5,828,695) as applied to claim 2 above, and further in view of Galins (US 2003/0021358 A1).

Claim 3 inherits all limitations of claim 2 above. As noted above, the combination of Galins and Webb disclose all limitations of claim 2. They do not however disclose the communications method of claim 2, characterized in that on the respective circles, the signal points of the integral multiple of 4 are spaced uniformly to be symmetric.

However, Galins discloses in Fig. 3, in US 2003/0021358 A1 128-Ary signal constellation suitable for non-linear amplification wherein he teaches on the respective circles, the signal points of the integral multiple of 4 (32/32/24/26/26/8) are spaced uniformly to be symmetric (pg(s). 3-4, [0030]; The chart lists the position each of the 128 signal points in Fig. 3. From the Angle of the signal points, one can see that signal points of integral multiples of 4 are spaced uniformly to be symmetric).

One of ordinary skill in the art would have been motivated to incorporate the teachings of Galins (US 2003/0021358 A1) as a method of providing suitable tradeoff between resolution and power while enabling the best use of available power (pg. 5, paragraph 0040).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Lane discloses in US Patent 5,381,450 Technique For Automatically Detecting the Constellation Size of A Quadrature Amplitude Modulated (QAM) Signal.

b.) Nakamura et al. discloses in US Patent 5,168,509 Quadrature Amplitude Modulation Communication System With Transparent Error Correction.

c.) Nakamura et al. discloses in US Patent 4,602,374 Multi-level Decision Circuit.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

lbw
August 7, 2008

/Lawrence B Williams/
Primary Examiner, Art Unit 2611